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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

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MRAP OUIII AR 654 7-17 PERT WALL
FIELD CHARACTERIZATION SUMMARY, MARCH 1999
MONTICELLO PERT WALL PROJECT 3/4/99

CONTRACT NO.: DE-AC13-96GJ87335
TASK ORDER NO.: MAC99-12
CONTROL NO.: 3100-T99-0554

March 4, 1999

Project Manager
Department of Energy
Grand Junction Office
2597 B¾ Road
Grand Junction, Colorado 81503
ATTN: Mr. Vernon A. Cromwell

Subject: Field Characterization Summary, March 1999—Monticello PeRT Wall Project

Dear Mr. Cromwell:

The attached package presents the results from the sampling conducted in January 1999 along the proposed area for the PeRT wall in Monticello. This information generally supersedes the prior characterization information because it is closer to the proposed PeRT wall location and obtained more recently. If you are interested in comparing the analytical results to the preliminary remediation goals, please refer to documents generated for Operable Unit III (e.g., the Remedial Investigation/Feasibility Study). Please note that this package is not a deliverable under the PeRT Wall Task Order.

If you have any questions, please contact me at Extension 6588.

Sincerely,

TR Bartlett for Clay Carpenter

Clay E. Carpenter, Manager
Permeable Reactive Treatment Wall

CEC/djd
Attachments (6)
cc w/: T.R. Bartlett
C. E. Carpenter
S. J. Morrison
File: PTW 1.3
MSG 2.11.4

K:\ENGR\TCWP6\PERTWALL\MISC\LTR_DOE.WPD

2597 B 3/4 ROAD
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MONTICELLO PERT PROJECT
FIELD CHARACTERIZATION SUMMARY, MARCH 1999

Introduction

A field investigation was conducted during January and February 1999 to characterize subsurface conditions in the vicinity of the proposed PeRT wall at the Monticello Mill Tailings Site, Monticello, Utah. The proposed location of the PeRT wall has changed since an initial characterization effort was completed in July 1998, and reported in September 1998. This report summarizes the results of the investigation in the new proposed location. Supplementary information from previous investigations has also been incorporated in this summary.

Field Program

The attached figures and tables summarize characterization data obtained during January and February 1999 for the Monticello PeRT project. During that time, subsurface conditions were investigated at 16 new locations in the area of the proposed PeRT wall (Figure 1). The field investigation consisted of using a Geoprobe rig to collect core samples within the unconsolidated and bedrock formations in the PeRT area. Core samples were examined to determine subsurface lithology and depth to bedrock at each location. Temporary small diameter PVC piezometers were installed at 15 locations for water level measurement and ground water sample collection for uranium analysis. Each location was surveyed for location, ground surface elevation, and top of PVC casing elevation (Table 1). A piezometer was not set at location PW99-02 (refer to Figure 1and discussion below).

Water level measurements and ground water samples were also obtained from numerous piezometers and monitoring wells in the PeRT area installed during previous investigations. In addition, field mapping and subsurface data from previously installed boreholes, wells, and piezometers was used to develop contour maps of the bedrock surface (Figure 2) and water table (Figure 3), and a geologic cross section (Figure 4). The distribution of uranium in alluvial ground water is presented in Figure 5 (see also Table 2).

Summary of Results

Bedrock Topography

The bedrock surface is relatively flat across the floor of the Montezuma Creek valley, exhibiting about 1 to 2 ft of vertical relief. North of location PW99-16, and south of PW99-03, PW99-01, and PW99-09, the bedrock surface rises steeply. The north and south margins of the alluvial aquifer approximately coincide with these changes in bedrock slope. A subtle depression or trough in the bedrock surface is apparent along the southern margin of the aquifer near location PW99-08. On the south side of Montezuma Creek, the depth to bedrock progressively increases to the south, from about 17 ft below ground surface at PW99-07 to 34 ft at PW99-09 and PW99-03, as a result of ground surface topography and increasing overburden thickness. Bedrock was encountered at 22 ft below ground surface at PW99-02, reflecting the rising bedrock surface to the south in that area.

Within the valley floor on the north side of the creek, bedrock was encountered between 8 and 14 ft below ground surface. The depth to bedrock varies in this area because of the irregular ground surface created during recent remedial action soil removal. In the area north of PW99-16, where the ground surface topography rises above the valley floor, the elevation of the bedrock is inferred from subcrops exposed during soil remediation east of the PeRT area (see Figure 2) and from boreholes completed during previous investigations. The subcrops were field mapped and the location and elevation of the contact between bedrock and overburden were determined by land survey methods in February 1999. Field evidence indicates that the bedrock surface in the subcrop areas rises steeply to the north, coincident with the rise in ground surface topography in that area. This information is consistent with the previous PeRT characterization results in identifying a bedrock high immediately north of the slope break along the northern margin of the valley floor. Farther north, in the vicinity of PW98-09A (Figure 2), the slope of the ground surface and bedrock becomes less steep.

Bedrock Lithology

The upper bedrock in the PeRT area consists primarily of dark gray mudstones belonging to the middle section of the Dakota Sandstone Formation. The mudstone was penetrated relatively easily to about 3 ft with the Goeprobe rig and 2-inch core barrel. The upper 6-inches of the mudstone is typically moist and cohesive, and yellow to olive gray. With depth, the mudstone becomes dry, firmer, and less cohesive, and is dark gray. In the area of the proposed reactive gate, the upper bedrock generally consists of mudstone at least 2.5 to 4 ft thick. A thin, easily penetrated, carbonaceous interval (≅ 0.3 ft thick) was present at approximately 9.5 ft at PW99-14. The bedrock could not be penetrated at one location (PW99-13) in the gate area. Attempts to sample bedrock at 3 separate offsets at that location each resulted in refusal at 10.5 ft below grade. The offsets were spaced about 1 foot apart. Small chips recovered from the tip of the sampler consisted of light gray fine sandstone or siltstone. At adjacent locations PW99-12 and PW99-14, the top of bedrock was approximately at the same elevation but consisted of mudstone. Bedrock may be slightly higher at PW99-13 and consist of a thin interval of hard siltstone or sandstone, or a relatively large, hard, flat boulder may be present on the bedrock surface. However, at other locations it was possible to penetrate sandstone cobbles 3 inches in diameter.

Along the north funnel wall at location PW99-15, the upper 2 ft of bedrock consisted of gray mudstone with a thin carbonaceous interval (≅ 0.3 ft thick) within the lower foot of the sample. At PW99-16, the upper 2 ft of bedrock was also gray mudstone, underlain by 0.5 ft of mudstone with wavy-bedded siltstone and carbonaceous laminae to the total depth sampled. Farther north of PW99-16, bedrock probably consists of about 5 to 10 ft of interbedded mudstone, coal and carbonaceous shale that is overlain by 5 to 10 ft of sandstone (Figure 4). The lithology and thickness of the bedrock in that area is inferred from subcrops exposed during soil remediation east of the PeRT area (see Figure 2). Coaly shale encountered at PW99-09A apparently overlies the sandstone unit.

In the area of investigation on the south side of Montezuma Creek, the upper 2 ft of bedrock consists primarily of gray mudstone. Silty mudstone was present in the bottom 0.5 ft interval sampled at PW99-04. Bedrock could not be penetrated at location PW99-05, where small chips recovered from the tip of the sampler consisted of light gray siltstone. This siltstone does not correlate well with adjacent boreholes, where less resistant mudstone occurs through the same interval. The elevation where refusal occurred at PW99-05 is not anomalous relative to surrounding locations and therefore, a hard siltstone cobble may be present at the bedrock surface, or the upper bedrock consists of a relatively thin (≅ 1 ft) discontinuous layer of hard siltstone at that location. The upper 3 ft of bedrock at PW99-02 consisted of easily penetrated black coaly shale separated by 2 thin beds (≤0.5 ft) of gray mudstone.

Lithology of Unconsolidated Deposits

Approximately 3 to 5 ft of coarse alluvial gravel and cobbles overlie bedrock on the south side of Montezuma Creek. The alluvium tends to thicken by 2 to 3 ft on the north side of the creek to a maximum thickness of approximately 8 ft at PW99-14. In general, sand and silt comprise a subordinate fraction of the alluvium. The gravel fraction is typically well-graded and fine to medium cobbles (3 to 6 inches are abundant. Occasional coarse cobbles (up to about 10 inches) were observed in the alluvium exposed at ground surface at PW99-14. On either side of the creek, the alluvial deposits terminate against bedrock or bedrock mantling hillslope colluvium and loess.

South of the creek at location PW99-02, alluvial deposits are absent. The unconsolidated deposits instead consist entirely of interbedded loess and colluvium. The loess is composed of fine sandy red silt with occasional gravel or cobbles. Rootlets, fragments of black organic material, and caliche are common within the loess. The colluvium is similar to the loess but contains repeated sequences of thinly bedded shale clasts supported in a fine matrix. Much of the colluvium probably represents sheet wash deposits along the base of the upper bedrock hillslopes. Approximately 15 to 20 ft of interbedded loess and colluvium are locally exposed along the south bank of Montezuma Creek. Similar deposits are not observed on the north side of the creek, where the coarse alluvium is instead overlain by flood plain deposits of fine sandy silt. The overbank deposits merge with fine grained hillslope cover at the margin of the valley floor which contains occasional gravel and cobbles. A layer of coarse river terrace cobbles that is about 12 ft thick at PW98-09A overlies the top of the bedrock high area. The terrace deposit is believed to thin to several feet at the southern edge of the bedrock high.

Aquifer Boundaries

The northern limit of the aquifer depicted in Figure 3 closely follows the change in ground surface topography between the flat valley floor and the terrace feature immediately to the north. The southern boundary does not coincide with an obvious topographic feature at the ground surface. As described above, both boundaries occur where the bedrock rises steeply to the north and south from a relatively flat surface beneath the central portion of the valley.

Several feet of granular alluvium were encountered above bedrock at PW99-16, however, only the lower 0.1 ft was noticeably wet during drilling and sampling. The bedrock was dry. Since then, the water level has remained in the screen interval below the bedrock/alluvium contact, indicating that at present, the saturated thickness at that location is negligible. The unconsolidated deposits and upper bedrock at PW98-15, installed in June 1998, have remained unsaturated since that time. At PW98-16 (not shown), located approximately 30 ft south of PW98-15, 4 to 5 ft of saturated alluvium were present during May through July 1998. The piezometer has since been damaged and is unusable. Piezometer PW98-09A has also been damaged beyond use. Ground water monitoring during May through July 1998 indicated unsaturated conditions in the unconsolidated deposits and upper bedrock at that location. The northern limit of the aquifer is inferred to extend east of PW99-16 to the top of the sandstone subcrop shown in Figure 3. At that location, approximately 7 ft of sandstone are overlain by several feet of dry cobbles.

Ground water was not encountered at PW99-01, although several feet of coarse cobbles and gravel were present above the bedrock. Figure 2 indicates that bedrock in the vicinity of PW99-01 projects slightly to the north at an elevation that is above the water table and bedrock at adjacent locations to the west and east along the hillslope contour (PW99-03 and PW99-09, respectively). Ground water was also not encountered at PW99-02. Alluvial deposits were absent at that location and the bedrock surface is well above the water table and alluvium to the north. A piezometer was not set at PW99-02. The borehole was left open for about two weeks after drilling and remained dry. It was then filled with bentonite chips. Potable water was used to hydrate the chips near the ground surface.

Piezometer PW98-15 was abandoned in February 1999 by pulling the casing and screen and filling the hole with bentonite chips which were hydrated near ground surface with potable water. Piezometers PW98-10 and PW-98-11 were also abandoned in February 1999 when the area was excavated into the alluvium during soil remediation. Casings and screens were pulled prior to excavation.

Water Table and Ground Water Flow

The water table of the alluvial aquifer in the PeRT area for the period of January 28 to February 2, 1999 is illustrated in Figure 3. The dominant direction of ground water flow is indicated to be southeast, which is approximately perpendicular to the north and south margins of the aquifer, and parallel to the general slope of the bedrock surface beneath the valley floor in this area. Along the southern margin of the aquifer, a small southeast trending trough is apparent in the water table. Locally, ground water flow is to the south toward the trough. The position of the water table trough coincides with the previously described bedrock low in that area (Figure 2), and reflects the effect of bedrock topography on the direction of ground water flow.

Current ground water levels in the PeRT area north and south of the creek are, respectively, about 4 to 6 ft and 1 to 2 ft lower than when measured during May through July 1998. The depressed water table in the PeRT area is the result of ongoing aquifer dewatering on the millsite that began in March 1998. Since that time, ground water has been intercepted by a trench located along the western edge of the former Carbonate Pile and diverted either to Pond 3 or Montezuma Creek. This has significantly reduced ground water flux off the millsite and has allowed the aquifer to drain. Water levels upgradient of the millsite and east of the PeRT wall area are presently consistent with historical ranges and therefore do not indicate a regional or seasonal decrease on the order observed in the PeRT area. The saturated thickness of the alluvial aquifer north and south of the creek in the PeRT area is about 1 to 2 ft. At present, Montezuma Creek is inferred to recharge the aquifer in the PeRT area. This may reduce the effect of millsite dewatering within the aquifer south of the creek. Despite the overall water table lowering, the pattern of ground water flow has remained essentially unchanged in the PeRT area. The lower water table also suggests that leakage from Pond 3 may be negligible.

Uranium Distribution in Ground Water

Ground water samples were collected from piezometers in the PeRT area on January 28 and February 2, 1999 for analysis of uranium. The sampling locations and analytical results are given in Table 2 and Figure 5. All water bearing piezometers installed in January 1999 were sampled. Several piezometers installed during May and June 1998 were also sampled. Several were not however because of low water levels and slow recharge. Samples were collected using a peristaltic pump and HDPE tubing at locations where the depth to ground water was less than 25 ft. The remaining locations (PW99-03, PW99-04, PW99-08, and PW99-09) were sampled with an HDPE bailer. PW99-16 was also sampled with a bailer because of the very slow recharge rate and limited sample volume. The piezometers were not developed or purged according to conventional methods. Some locations required surging and pumping to improve yield. At each location except PW99-16, at least one casing volume was evacuated prior to sample collection. All samples collected by pump were filtered and preserved with nitric acid in the field. Bailed samples were not filtered or acidified in the field. They were instead kept in an ice water bath until filtered and acidified in the laboratory. The samples were analyzed at the Grand Junction Office Environmental Sciences Laboratory during the week of February 8, 1999.

The map distribution shows that the lowest concentration was detected at PW99-16 (0.10 mg/L), located along the northern margin of the aquifer. From that location, concentrations then progressively increase to the south across the valley. This distribution is consistent with the June 1998 sample results. With one exception, the results among samples collected north of the creek in February 1999 and June 1998 are also very comparable in magnitude. At PW98-10, the uranium concentration is presently about 2-times greater than in the 1998 sample from that location. The uranium concentration detected at PW99-10 in 1999 (2.6 mg/L) is the highest for that sampling event. The results indicate that elevated uranium concentrations exist in ground water on the north side of the creek upgradient of the proposed reactive gate.

South of the creek, the result for PW99-07 is very similar to that for nearby PW98-17, which was sampled only in June 1998. At location PW98-19, which was sampled during both events, the recent uranium concentration is about one-half the previous result.

Enhanced dilution as a result of the strong losing stream potential in that area may account for the decrease in concentration. Uranium concentrations do not decrease toward the margin of the aquifer as observed north of the creek. Instead, the maximum concentrations tend to be nearest the margin, coincident with the subtle bedrock depression and water table trough. The overall distribution of uranium suggests that a separate lobe of the contaminant plume extends along the southern margin of the aquifer, possibly the result of different source areas and concentrations to the west; or, uranium transport follows an abrupt change in ground water flow from southeast to nearly due south in the immediate area of investigation.

Monticello PeRT Project Characterization Data Summary, February 1999.

Table 1

Location	Northing	Easting	Date Completed	Elevation Ground Surface [ft]	Elevation Top of PVC [ft]	Stickup [ft]	Total Depth Drilled [ft]	Bottom of Screen [ft bgs]	Depth to Bedrock [ft bgs]	Elevation Bedrock [ft]
PW99-01	10065.66	23860.83	1/19/99	6816.7	6817.57	0.87	34	32.8	31.5	6785.2
PW99-02	10036.03	23732.65	1/19/99	6823.2	NA	NA	24.4	NA	21.9	6801.3
PW99-03	10087.11	23792.00	1/20/99	6817.0	6818.24	1.24	35.5	33.8	34	6783.0
PW99-04	10106.72	23820.40	1/20/99	6814.9	6815.51	0.61	32	31	31.1	6783.8
PW99-05	10133.69	23854.95	1/21/99	6807.3	6808.45	1.15	24	23.9	24	6783.3
PW99-06	10164.65	23884.63	1/21/99	6800.7	6801.74	1.04	18.5	16.5	16.5	6784.2
PW99-07	10189.33	23929.14	1/25/99	6801.9	6802.93	1.03	20	17.7	17.4	6784.5
PW99-08	10067.54	23921.44	1/22/99	6812.4	6813.05	0.65	32	31.9	31.5	6780.9
PW99-09	10033.70	23939.07	1/25/99	6814.7	6815.29	0.59	34.5	34.4	34.25	6780.5
PW99-10	10256.92	24032.49	1/26/99	6794.3	6797.06	2.76	13.5	12.2	11.7	6782.6
PW99-11	10255.88	23999.88	1/26/99	6795.2	6798.24	3.04	12	12	11.6	6783.6
PW99-12	10284.79	24053.21	1/26/99	6793.8	6797.39	3.59	13.5	11.4	11.1	6782.7
PW99-13	10310.83	24070.56	1/26/99	6792.9	6797.45	4.55	10.5	10.5	10.5	6782.4
PW99-14	10335.16	24088.68	1/27/99	6790.2	6790.62	0.42	12	9.6	8	6782.2
PW99-15	10401.66	24067.39	1/28/99	6795.6	6796.68	1.08	15	13.9	13	6782.6
PW99-16	10438.02	24064.65	1/28/99	6799.4	6803.17	3.77	17	16.2	14.3	6785.1

northings and eastings per Monticello Projects Coordinate System

bgs = below ground surface

NA = not applicable

Monticello PeRT Project Characterization Data Summary, con't., February 1999.

Table 2

Location	Water Level Measurement Date: 1/28/99				Water Level Measurement Date: 2/2/99				Uranium [mg/L] 1/28 - 2/2/99
	Depth to Water [ft btoc]	Depth to Water [ft bgs]	Elevation Water [ft]	Saturated Thickness [ft]	Depth to Water [ft btoc]	Depth to Water [ft bgs]	Elevation Water [ft]	Saturated Thickness [ft]	
PW99-01	DRY	NA	NA	0.0	DRY	DRY	NA	0.0	NA
PW99-02	DRY	NA	NA	0.0	DRY	DRY	NA	0.0	NA
PW99-03	34.15	32.91	6784.09	1.1	34.19	32.95	6784.05	1.1	1.394
PW99-04	30.69	30.08	6784.82	1.0	30.68	30.07	6784.83	1.0	2.484
PW99-05	23.40	22.25	6785.05	1.8	23.43	22.28	6785.02	1.7	2.304
PW99-06	16.05	15.01	6785.69	1.5	16.08	15.04	6785.66	1.5	1.806
PW99-07	17.61	16.58	6785.32	0.8	17.65	16.62	6785.28	0.8	1.233
PW99-08	30.93	30.28	6782.12	1.2	30.95	30.3	6782.10	1.2	2.200
PW99-09	33.48	32.89	6781.81	1.4	33.51	32.92	6781.78	1.3	1.479
PW99-10	13.01	10.25	6784.05	1.4	13.05	10.29	6784.01	1.4	1.326
PW99-11	13.96	10.92	6784.28	0.7	14.03	10.99	6784.21	0.6	1.454
PW99-12	13.49	9.9	6783.90	1.2	13.54	9.95	6783.85	1.2	0.622
PW99-13	13.92	9.37	6783.53	1.1	13.91	9.36	6783.54	1.1	0.525
PW99-14	ND	ND	ND	ND	7.74	7.32	6782.88	0.7	0.449
PW99-15	ND	ND	ND	ND	12.54	11.46	6784.14	1.5	0.262
PW99-16	DRY	DRY	NA	0.0	19.19	15.42	6783.98	-1.1 *	0.103
PW98-10	14.45	13.3	6789.00	0.5	ND	ND	ND	ND	2.599
PW98-12	17.83	16.8	6786.31	1.6	ND	ND	ND	ND	1.864
PW98-13	15.45	14.6	6785.91	1.7	ND	ND	ND	ND	ND
PW98-14	14.70	13.2	6785.91	1.3	ND	ND	ND	ND	ND
PW98-15	DRY	DRY	NA	0.0	DRY	DRY	NA	0.0	NA
PW98-17	17.24	17.1	6784.18	1.4	17.84 **	17.7	6783.58	0.8	ND
PW98-18	20.50	20.6	6783.44	0.5	20.5	20.6	6783.44	0.5	ND
PW98-19	22.60	22.6	6784.91	2.2	22.55	22.5	6784.96	2.3	2.041
92-07	20.54	18.5	6785.31	2.0	ND	ND	ND	ND	ND
88-85	11.95	11.5	6785.56	1.0	ND	ND	ND	ND	ND
92-11	20.04	19.3	6793.69	1.3	ND	ND	ND	ND	ND

bgs = below ground surface

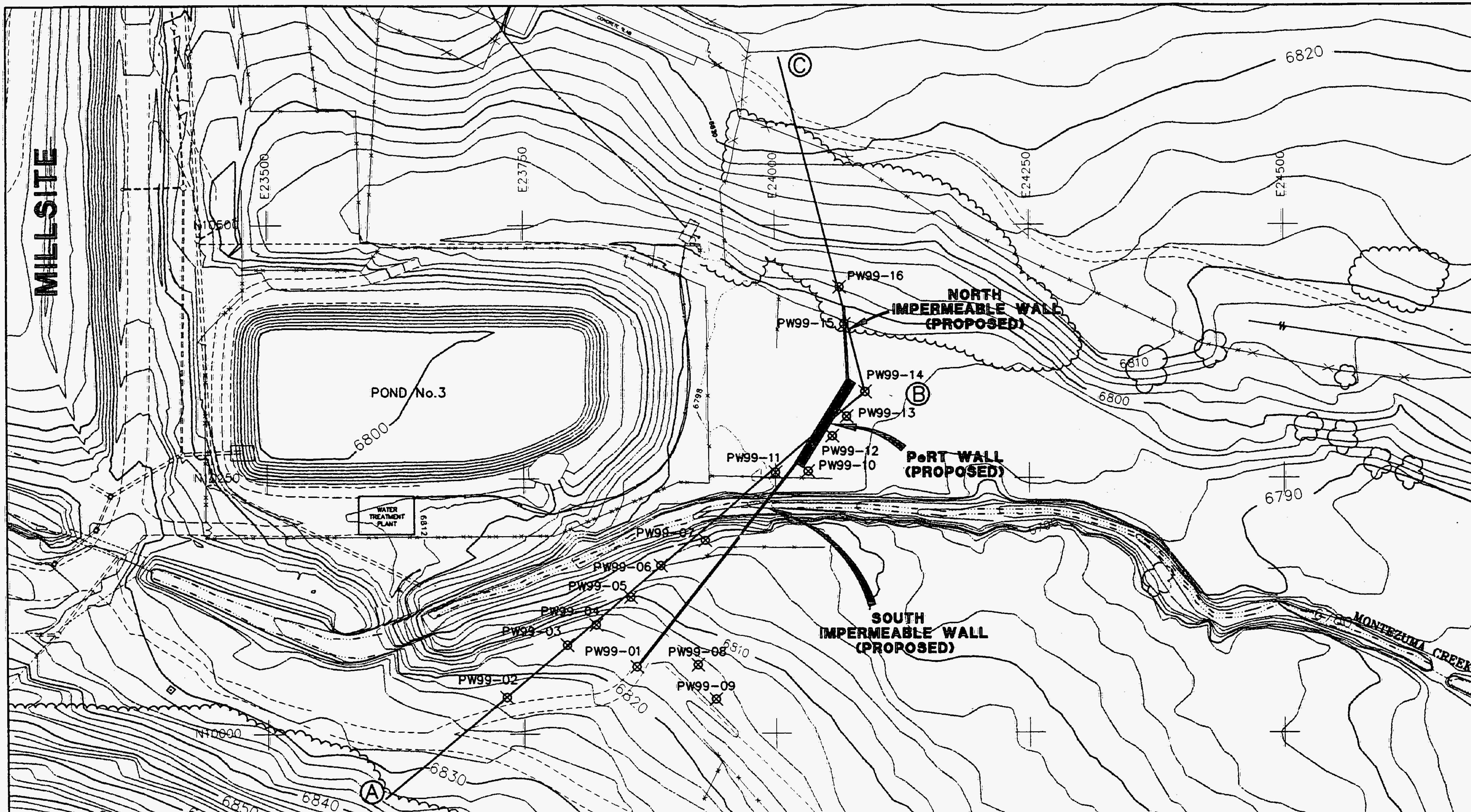
btoc = below top of casing

ND = no data

NA = not applicable

* Water level is in screen below top of bedrock. Approximately 0.1 ft wet alluvium above dry bedrock observed during drilling. Very slow recharge, measured water level is not at equilibrium.

** Incomplete recovery after pumping to remove grout from screen.



LEGEND

TREE/BRUSH

PW99-02 BOREHOLES COMPLETED IN JANUARY 1999.

FENCE

Ⓐ-Ⓑ-Ⓒ LINE OF GEOLOGIC CROSS-SECTION (SEE FIGURE 4)

N

SCALE IN FEET: 50 25 0 50 100 150

CONTOUR INTERVAL = 2 FEET

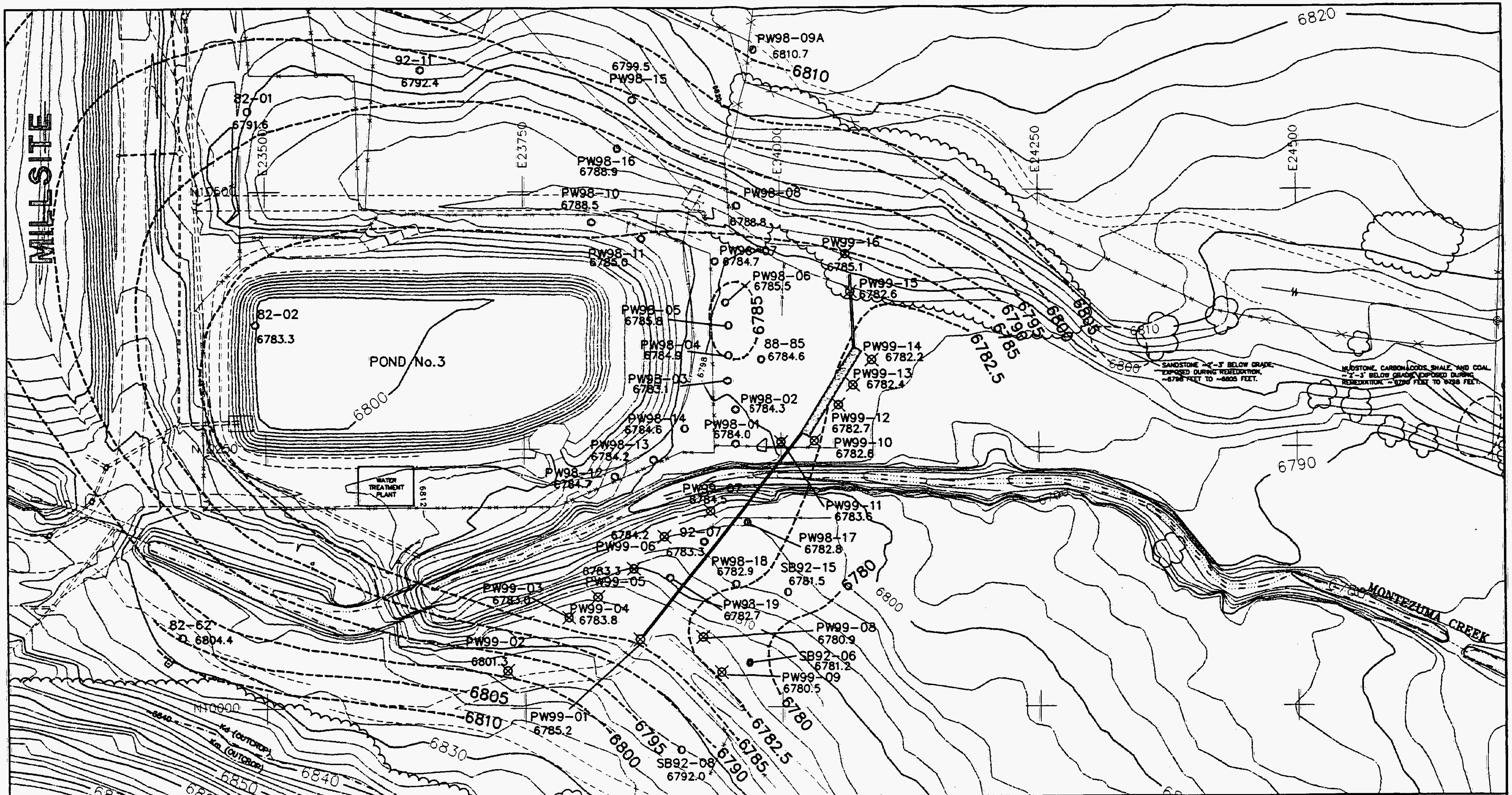
M:\PTW\121\0002\K00053AA.DWG 02/23/99 10:45am J60191

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

Figure 1 JANUARY 1999 PeRT CHARACTERIZATION LOCATIONS

DATE PREPARED: FEBRUARY 23, 1999

FILENAME: K00053AA



LEGEND

6782 - - - - - - BEDROCK ELEVATION CONTOUR

PW99-01 / 6785.2 — JANUARY 1999 BORING LOCATION, BEDROCK ELEVATION (FEET)

92-07 / 6783.3 — SOIL BORING/WELL INSTALLED PRIOR TO JANUARY 1999, BEDROCK ELEVATION (FEET)

TREE/BRUSH

FENCE

N

SCALE IN FEET

50 25 0 50 100 150

CONTOUR INTERVAL = 2 FEET

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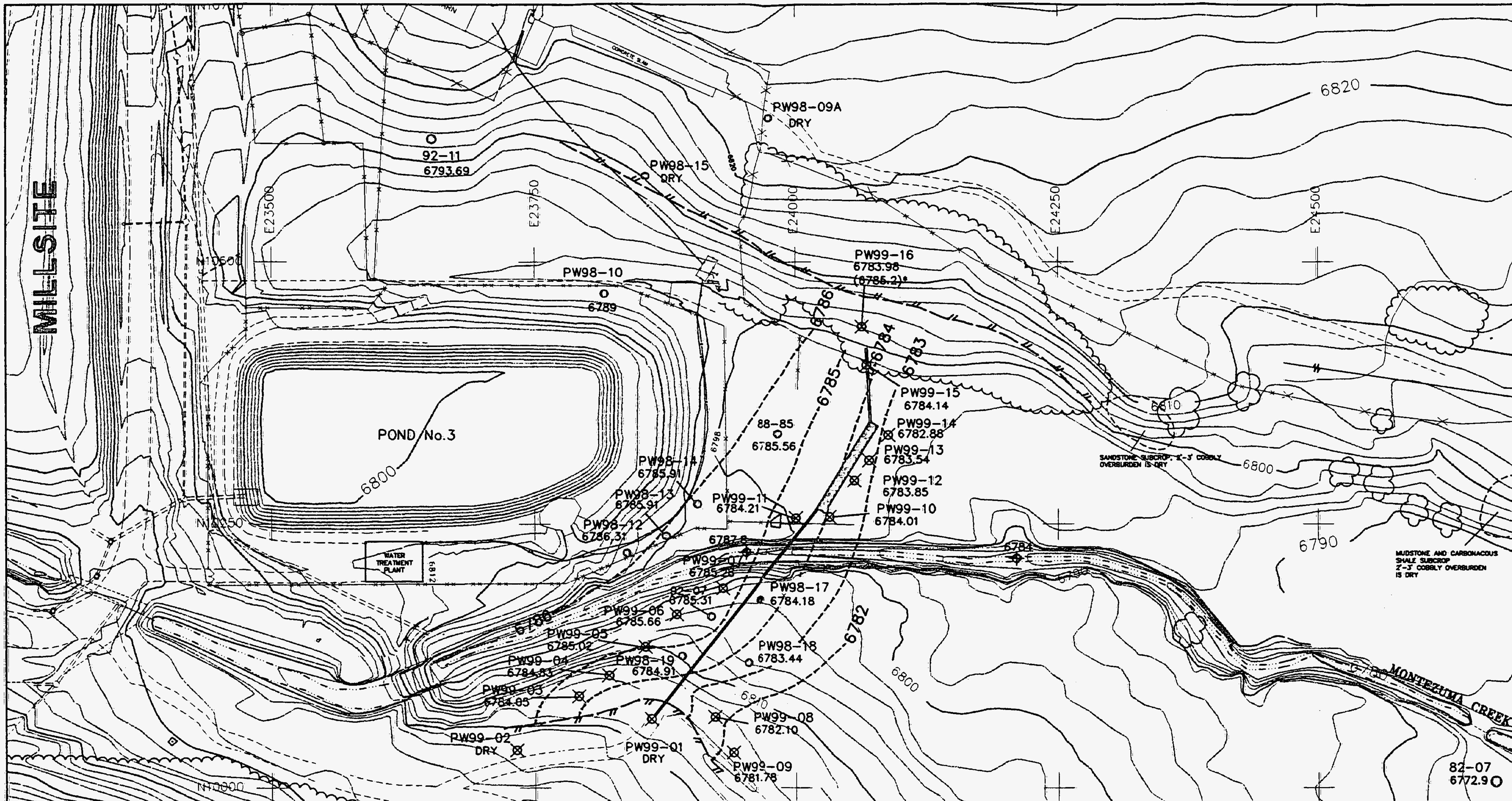
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

Figure 2 BEDROCK ELEVATION MAP IN PeRT WALL AREA

DATE PREPARED: MARCH 2, 1999

FILENAME: K00057AA



LEGEND

6782	WATER TABLE COTOUR
	APPROXIMATE LIMIT OF ALLUVIAL AQUIFER
92-11 / 6784.83	WELLS/PIZOMETERS INSTALLED PRIOR TO JANUARY 1999. GROUND WATER ELEVATION
PW99-09 / 6781.78	TEMPORARY PIEZOMETERS INSTALLED JANUARY 1999. GROUND WATER ELEVATION
	TREE/BRUSH
	FENCE
6784.83	CREEK STAGE (10/97 DATA)

N

SCALE IN FEET
50 25 0 50 100 150
CONTOUR INTERVAL = 2 FEET

NOTE:

* WATER LEVEL HAD NOT REACHED EQUILIBRIUM AT TIME OF MEASUREMENT. APPROXIMATELY 0.1 FEET WET ALLUVIUM ENCOUNTERED AT PW99-16 ABOVE BEDROCK DURING DRILLING. ASSUME STATIC WATER LEVEL IS ~6785.2 FEET (BEDROCK AT ~6785.1 FEET).

MACTEC-GJS

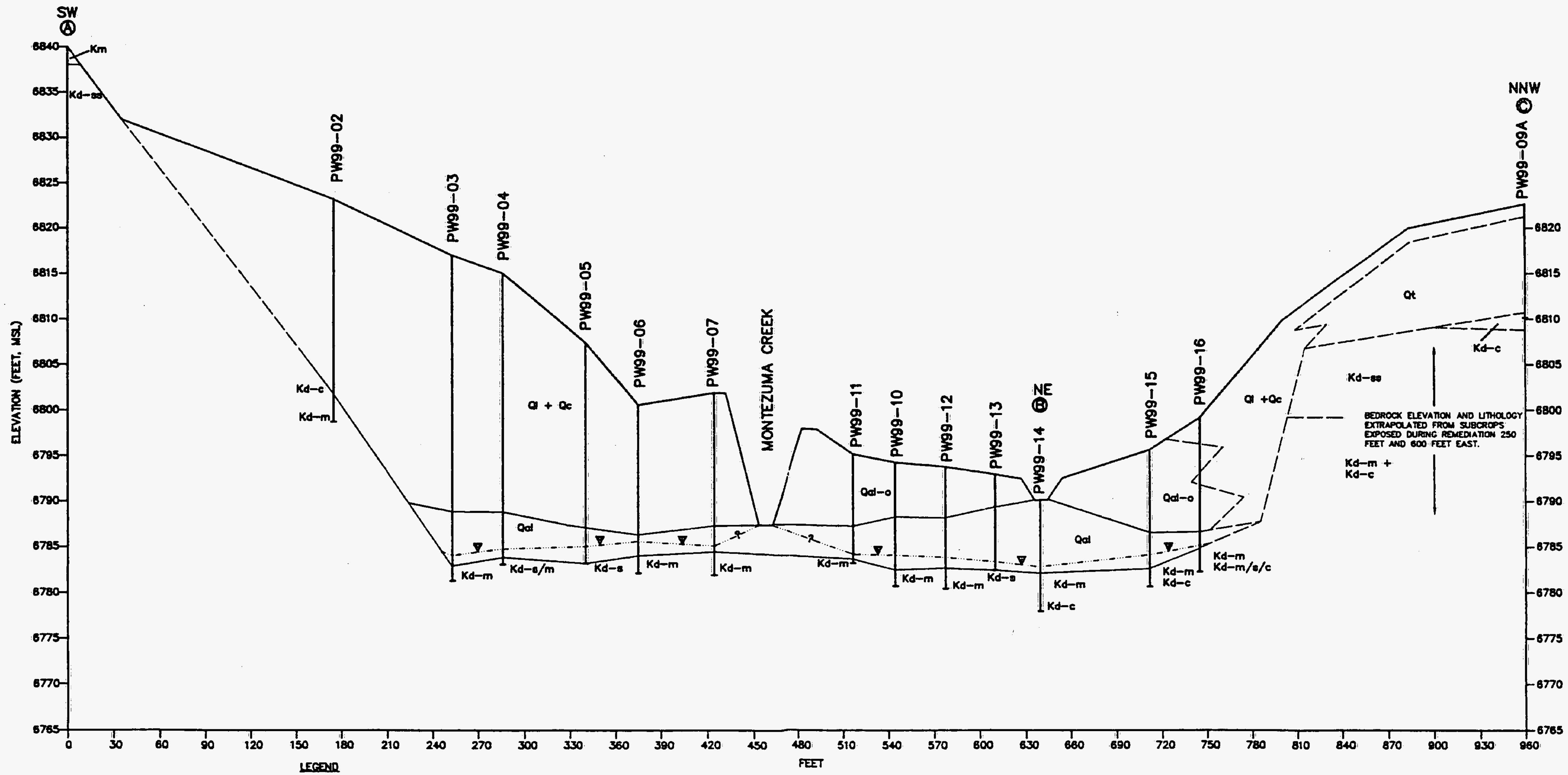
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

Figure 3 WATER TABLE CONTOUR MAP IN PeRT WALL AREA, JANUARY 28 TO FEBRUARY 2, 1999

DATE PREPARED: MARCH 2, 1999

FILENAME: K00056AA

M:\PTW\121\0002\K00056AA.DWG 03/02/99 3:59pm J50191



VERTICAL EXAGGERATION = 6

LEGEND

Km	MANCOS SHALE
Kd DAKOTA FM.	
Kd-m	MUDSTONE
Kd-c	COAL OR CARBONACEOUS SHALE
Kd-s	SILTSTONE
Kd-ss	SANDSTONE
▼	WATER TABLE, JANUARY 28 - FEBRUARY 2, 1999

Q QUATERNARY DEPOSITS

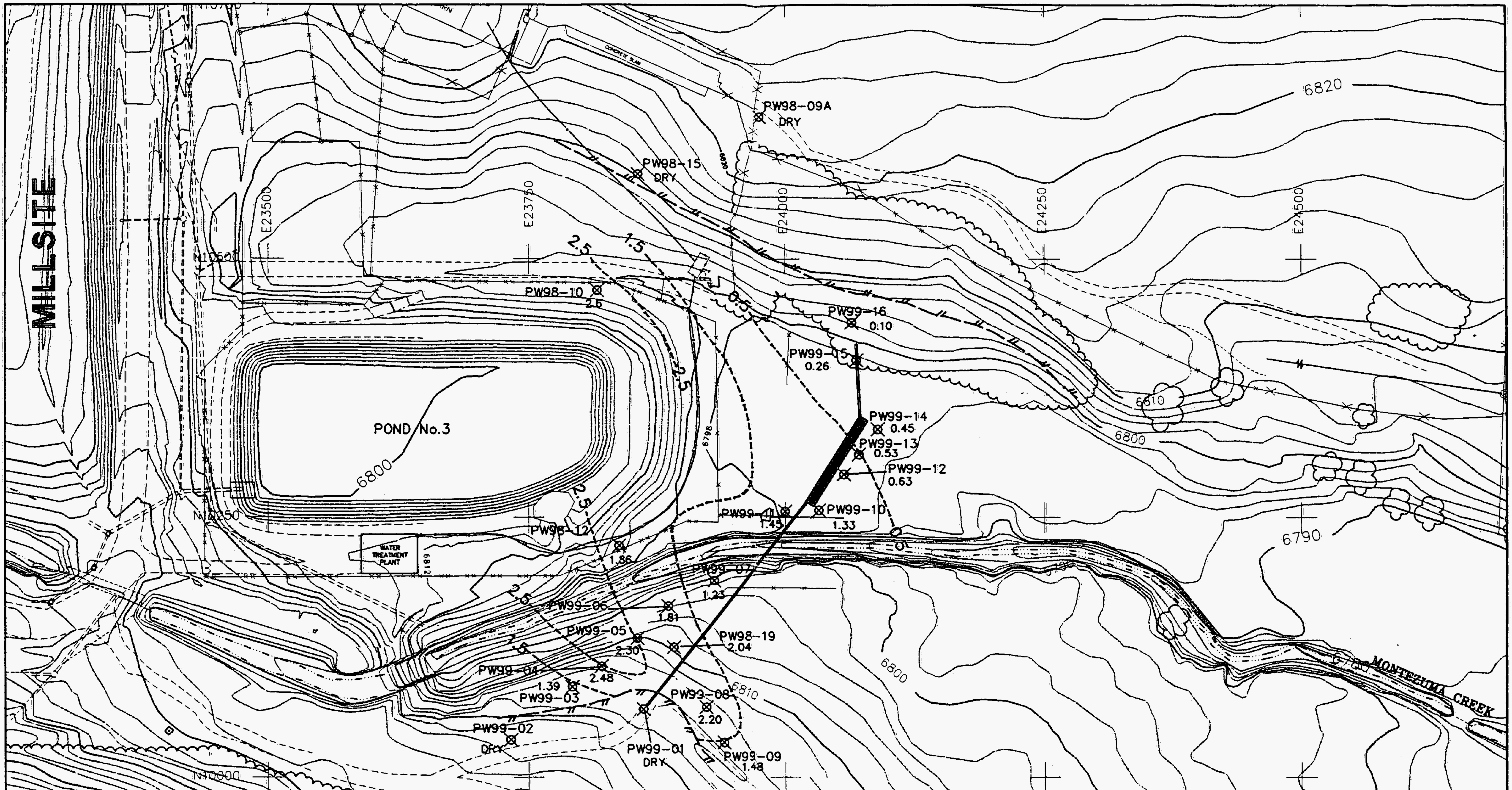
Qal	COARSE ALLUVIAL GRAVEL AND COBBLES, WITH SAND, LITTLE TO NO FINES
Qal-o	ALLUVIAL OVERBANK DEPOSITS, SANDY SILT
Ql	SANDY SILT WITH CLAY, LOESS, OFTEN WITH CALICHE, ROOTLETS, AND ORGANIC MATER
Qc	COLLUVIAL SLOPE COVER, FINE SANDY SILT WITH SOME CLAY, GRAVEL, COBBLES. INTERBEDDING OF ABUNDANT SHALE CLASTS IS COMMON (SHEET WASH, CREEP, AND FAN DEPOSITS).
Qt	TERRACE DEPOSIT ABOVE PRESENT STREAM LEVEL, COBBLES AND GRAVEL WITH LITTLE TO NO SAND OR FINES.

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

Figure 4 GEOLOGIC CROSS SECTION THROUGH PeRT WALL AREA JANUARY 1999

DATE PREPARED: MARCH 2, 1999

FILENAME: K0055AA



LEGEND

1.5 - - - - -	URANIUM CONCENTRATION CONTOUR (mg/L)
	APPROXIMATE LIMIT OF ALLUVIAL AQUIFER
PW99-03	SAMPLE LOCATION AND NUMBER
1.39	URANIUM CONCENTRATION (mg/L) IN GROUND WATER JANUAY 29 – FEBRUARY 2, 1999
	TREE/BRUSH
	FENCE

N

SCALE IN FEET
50 25 0 50 100 150
CONTOUR INTERVAL = 2 FEET

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macTec-ers
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO

Figure 5 URANIUM CONCENTRATIONS IN GROUNDWATER

DATE PREPARED: MARCH 3,1999
FILENAME: K00054AA